



Rev. B | 2021.12

RDM Remote Display Module

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1 POLICIES

1.1 Important Note

Read and understand this manual prior to using this instrument. Carefully read the warranty policy, service policy, notices, disclaimers and revisions on the following pages.

This product must be installed by a qualified electrician or factory trained technician and according to instructions indicated in this manual.

This instrument has not been designed to be intrinsically safe. For your safety, **do not** use it in classified hazardous areas (explosion-rated environments).

INSTRUMENT SERIAL NUMBER:

PURCHASE DATE:

PURCHASED FROM:

1.2 Warranty Policy

Critical Environment Technologies Canada Inc. warrants the products we manufacture (excluding sensors, battery packs, batteries, pumps, and filters) to be free from defects in materials and workmanship for a period of two years from the date of purchase from our facility. Sensors are consumable items and once they leave our factory, we cannot reuse or resell them. As such, all sensor sales are final. Should the sensor itself be faulty, there is a one-year pro-rated warranty that would apply from the date of purchase from our facility.

The warranty status may be affected if the instrument has not been used and maintained as per the instructions in the manual or has been abused, damaged, or modified in any way. The product is only to be used for the purposes stated in the manual. Critical Environment Technologies is not liable for auxiliary interfaced equipment or consequential damage.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods, regardless of reason, must be accompanied with an RMA number. Please read our Warranty and Returns Policy and follow our RMA Instructions and Form.

Due to ongoing research, development, and product testing, the manufacturer reserves the right to change specifications without notice. The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data.

1.3 Service Policy

CETCI maintains an instrument service facility at the factory. Some CETCI distributors / agents may also have repair facilities; however, CETCI assumes no liability for service performed by anyone other than CETCI personnel.

Repairs are warranted for 90 days after date of shipment (sensors have individual warranties). Should your instrument require non-warranty repair, you

may contact the distributor from whom it was purchased, or you may contact CETCI directly.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods, regardless of reason, must be accompanied with an RMA number. Please read our Warranty and Returns Policy and follow our RMA Instructions and Form.

If the product is deemed repairable, for liability reasons, CETCI will perform all necessary repairs to restore the instrument to its full operating condition.

1.4 Copyrights

This manual is subject to copyright protection; all rights are reserved. Under international and domestic copyright laws, this manual may not be copied or translated, in whole or in part, in any manner or format, without the written permission of CETCI.

Modbus® is a registered trademark of Gould Inc. Corporation.
BACnet® is a registered trademark of American Society of Heating, Refrigeration and Air Conditioning (ASHRAE).

1.5 Disclaimer

Under no circumstances will CETCI be liable for any claims, losses or damages resulting from or arising out of the repair or modification of this equipment by a party other than CETCI service technicians, or by operation or use of the equipment other than in accordance with the printed instructions contained within this manual or if the equipment has been improperly maintained or subjected to neglect or accident. Any of the forgoing will void the warranty.

Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires. It is CETCI policy that all wiring of our

products meet this requirement and all wiring be within properly grounded (earth or safety) conduit.

1.6 Revisions

This manual was written and published by CETCI. The manufacturer makes no warranty or representation, expressed or implied, including any warranty of merchantability or fitness for purpose, with respect to this manual.

All information contained in this manual is believed to be true and accurate at the time of printing. However, as part of its continuing efforts to improve its products and their documentation, the manufacturer reserves the right to make changes at any time without notice. In addition, due to improvements made to our products, there may be information in this manual that does not exist in the version of the product the user has. Should you detect any error or omission in this manual, or should you want to inquire regarding upgrading the device's firmware, please contact CETCI at the following address:

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Telephone: +1.604.940.8741
Email: marketing@cetci.com
Website: www.critical-environment.com

In no event will CETCI, its officers or employees be liable for any direct, special, incidental or consequential damages resulting from any defect in any manual, even if advised of the possibility of such damages.

2 INTRODUCTION

2.1 General Description

Thank you for purchasing our RDM Remote Display Module. The RDM Remote Display is designed to connect to the FCS Flexible Control System to provide convenient viewing of gas readings and system statuses in an alternate and relevant location to the controller; such as a refrigeration application where there are two different entrances to the chiller room.

The RDM will display much of the same information as the FCS, such as gas level readings, channel status and faults.

2.2 Key Features

- 4-lines, 20 character LCD display and LED indicators for alarm STATUS 1, 2, 3 and Fault conditions
- Internal audible alarm
- Modbus® RS-485 RTU communication
- Output for remote strobe and/or horn connection
- Connection loss detection to ensure accurate information is displayed

3 INSTRUMENT SPECIFICATIONS

3.1 Technical Specifications

MECHANICAL

Enclosure	ABS / Polycarbonate, rated UL94-5VA, designed to meet IP54 standards. Copper coated interior to reduce RF interference.
Weight	272 g (9.6 oz)
Size	127 mm x 127 mm x 71 mm (5.0 in x 5.0 in x 2.8 in)

ELECTRICAL

Power Requirement	0.5 W of power using the 24 VDC supplied by the controller
Current Draw	20.8 mA
Wiring	4-wire shielded network wiring between the controller and RDM
Communication: Modbus® RTU over RS-485	Baud rate: 19,200 (default) Modbus® ID: 230 (default) Modbus® Broadcast ID: 253 (default) Data bits: 8 Start bits: 1 Stop bits: 1 Parity: none
Fuses	Automatic resetting thermal

USER INTERFACE

Display	4-line, 20 character LCD display and LED indicators for "STATUS 1, 2 and 3", "FAULT" Configurable contrast (default is 20)
Indicator	Status LED indicators for low, mid, high and fault alarms
Menu	Accessed using up, down and enter push buttons

INPUT/OUTPUT

Communication	Receives Modbus® commands from the FCS and duplicates the much of the display information
Outputs	One drive output for a 24V, max 500 mA remote strobe/horn
Audible Alarm	Internal buzzer

ENVIRONMENTAL

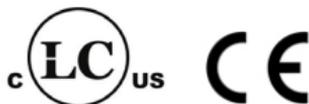
Operating Temperature	-20°C to 40°C (-4°F to 104°F)
Operating Humidity	15 - 90% RH non-condensing

CERTIFICATION

Model: CET-RDM

S/N: RDM1603B00001

Rating: 24 VDC, 0.5W, Class 2



CERTIFIED FOR ELECTRIC SHOCK & ELECTRICAL FIRE HAZARD ONLY. LA CERTIFICATION ACNOR COUVRE UNIQUEMENT LES RISQUES DE CHOC ELECTRIQUE ET D'INCENDIE D'ORIGINE ELECTRIQUE.

Conforms to: CSA-C22.2 No. 205-12 & CSA-C22.2 No. 61010-1-12

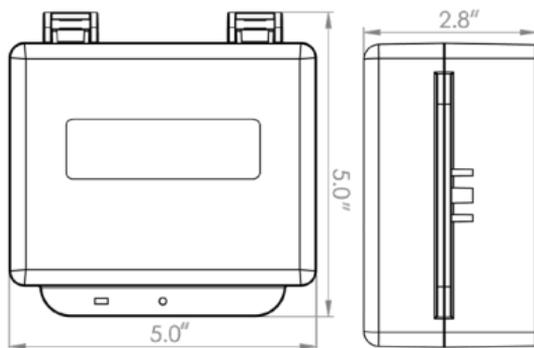
Conforms to: UL508 (Edition 17):2007 & UL 61010-1 (Edition 3)

Conforms to: EMC Directive 2004/108/EC, EN 50270:2006, Type 1, EN61010

Conforms to: FCC. This device complies with part 15 of the FCC Rules,

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

3.2 Enclosure Dimensions



4 INSTRUMENT FEATURES

4.1 Exterior Enclosure



NUMBER	FEATURE	FUNCTION
1	Door Hinge	Secures door.
2	Display	4 lines x 20 characters.
3	Status 1, 2, 3 LEDs	Indicates channel alarm status.

NUMBER	FEATURE	FUNCTION
①	Jumper Bank (J5)	Termination resistor. If this device is the last one in the network chain, a termination resistor should be connected by placing a jumper in the EN position
②	Modbus® Connector (TB2)	Terminal used to connect to the RDM to the FCS
③	Modbus® Connector (TB3)	Terminal used to connect other devices in the Modbus® network
④	Remote Strobe Terminal (TB1)	Connection for remote strobe or strobe/horn 24V 500 mA max.
⑤	Test Points: TP1 & TP2	Used for measuring voltage output
⑥	Buzzer	Internal audible alarm

5 INSTALLATION

5.1 General Safety Warnings

The RDM Remote Display is intended for indoor use, permanently mounted at a height that is appropriate for viewing, outside an area that requires a visual inspection of gas readings inside, prior to entry. The RDM should be protected from extreme weather conditions.

The RDM requires no assembly and virtually no maintenance. There are no serviceable elements or replaceable components.

5.2 Protection Against Electrical Risks

The RDM Remote Display is designed to be powered by the FCS. Disconnect all power to all network devices before servicing. There may be multiple power sources. Power supply may have a building installed circuit breaker / switch that is suitably located and easy to access when servicing is required. Appropriate markings should be visible at the circuit breaker / switch that is supplying power to controller.

This device may interfere with pacemakers. Modern pacemakers have built-in features to protect them from most types of interference produced by other electrical devices you might encounter in your daily routine. If you have a pacemaker, follow your healthcare provider's instructions about being around this type of equipment.

5.3 Protection Against Mechanical Risks

The door of the enclosure can be removed if absolutely necessary to facilitate installation of the base but it is not recommended on this version. Extreme care and caution must be exercised when removing the door to avoid damaging the hinges. The door should only be removed when absolutely required. Any damage occurring from door removal procedure will not be covered under warranty.

Simply grasp the door with one hand, being careful not to make contact with any of the internal components (circuit board), grasp the base with your other hand. Tug on the base and pull straight apart. **DO NOT TWIST**. The section of the hinges located on the base should "snap" apart from the part of the hinges located on the door.

After installation, simply locate the lid hinges over the installed base hinges and pull toward you. The hinges should easily “snap” back into place.

The enclosure has one screw securing the door to the base for electrical safety and provides an opening to allow the user to apply a padlock or tie wrap if they desire the transmitter to be locked. Refer to Section 4.1 Exterior Enclosure.

Be aware that the hinged door that could potentially pinch fingers and the sharp edges and/or jumper pins on the board could potentially prick or cut fingers if not handled carefully.

5.4 Enclosure Mounting Components

5.4.1 Enclosure Interior Base



NUMBER	FEATURE
1	Door Hinge
2	Mounting Holes

5.4.2 Enclosure Bottom



NUMBER	FEATURE
1	Door Hinge
2	1/2" Conduit Entry Knockout

5.5 Wiring Power Connections

The RDM Remote Display is a low voltage powered device. Any application of operating voltages higher than indicated in the specification may result in damage.

Double check wiring connections prior to powering the transmitter. Damage from incorrect wiring connections or from too much voltage applied is not covered under warranty.

External power to the RDM must be supplied by a 24 VDC power supply or a Class 2 (or better) transformer and connected to the Modbus® wiring terminal. The wiring should be 4-conductor shielded 16 awg stranded within conduit in a network wiring (daisy-chain) configuration.

Common wire colours for positive, negative and digital wires are:

- Red for positive
- Black for negative
- White for Data A
- Green for Data B

All wiring should be run within properly grounded (earth or safety) conduit. Signal output and supply should be in shielded cable. The cable shield should be connected to earth ground at the controller/power supply that is providing power for the RDM.

NOTE: WARRANTY VOID IF SOLID-CORE WIRE IS USED AT THE WIRING TERMINAL STRIP. When using solid core wiring for distribution (in the conduit), use stranded wire pigtailed 18 AWG within the enclosure to connect to the circuit board. The rigidity of solid-core wire can pull a soldered terminal strip completely off a circuit board and this will not be covered under warranty.

5.6 Wiring the RDM to the FCS

The RDM can be connected to the FCS using the Modbus® LAN terminal connection.

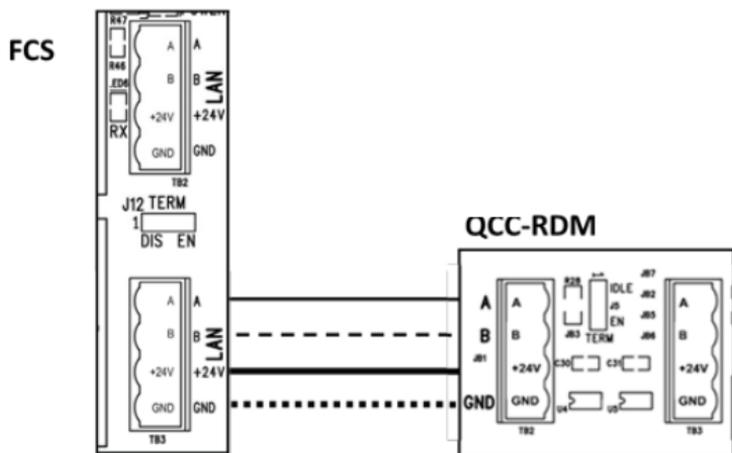
The read and write default RDM Modbus® ID is 230. The RDM will automatically broadcast the display information to Modbus® ID 253. This is the common Modbus® ID for all RDMs on the network and is used to listen for broadcasts from the controller and receive screen updates from the controller.

Once the RDM Remote Display is wired to the FCS, the controller needs to be told that the RDM exists as a remote device. This is done at the controller. Refer to the FCS Operation Manual for instructions.

Similarly, in order for the controller to communicate with the RDM, the two devices must have the same baud rate. The factory default baud rate for all CETCI Modbus® devices is 19,200. If you need to change the baud rate, refer to Section 6.6 Modbus® Settings for instructions on how to set the Remote Baud rate.

24VDC power is supplied to the RDM from the FCS. Four-conductor, 16-18 gauge wire / cable must be shielded when connecting the controller to the RDM.

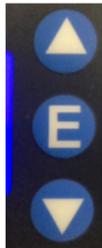
Wiring Connection for FCS and RDM



6 SYSTEM OPERATION & CONFIGURATION

6.1 Navigating the Menu Structure

There are three push-button keys to the right of the display that are used to navigate through the RDM Remote Display menu structure. To enter the menu, press E.



ARROW UP - used for going up through the menus or incrementing values or selecting an alpha character

ENTER - used primarily as an enter key, either for getting to the next screen or stepping through a numeric or alpha value

ARROW DOWN - used for scrolling down through the menus or decrementing values or selecting an alpha character

After entering the menus, pressing the ARROW UP key will normally take you to the Exit screen.

Most menus are circular and will bring you back to the Exit screen.

6.2 Accessing the Menu with Passcodes

The main menu structure is broken down by the passcode access entry. These passcodes allow for direct access to the parts of the menu system of interest.

CODE	NAME	DESCRIPTION
1001	Basic	Set LCD Contrast Set Modbus ID Set Baud Rate Mask Channels Set Silence Duration

6.3 Power Up and Warm-up

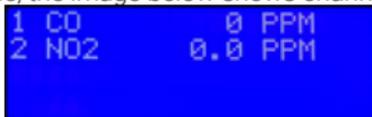
Upon power up, if the RDM is connected to an FCS, (and the controller's menu is not being accessed), the RDM will display the gas readings on the display line by line at an approximate speed of 1 to 3 seconds. (factory default).

If a faster scrolling rate is desired, the RDM Remote Display can be configured to scroll the gas readings page by page at an approximate speed of 5 to 10 seconds. Or the display can be configured to display the top 4 channels in high alarm only. The preferred configuration can be requested at the time of order or changed after installation. The changes are made using the Holding Registers.

NOTE: After the warm up period of the transmitters, the system may exhibit gas alarm condition(s) if any of the sensors have not completely stabilized during the warm up period. This is normal and the length of time the gas alarms exist is dependent upon the length of time since the unit was last powered up and the state of the environment it is installed in. After warm up, only the display should be active, indicating normal operation.

6.4 Normal Display

In normal operation, the RDM Remote Display will display the channel numbers with their corresponding gas type and level. When connected to an FCS, with fewer than 4 channels being used, there will be a blank line for each channel not being used. For example, the image below shows channel 1 and 2 in use only.



Because the FCS can accept up to 128 channel inputs, when connected to the FCS, the RDM will display the channel numbers as 3 digits long (ie. 001, 002, etc.).

At the end of each line a letter may be displayed that provides information about the status of the Channel:

Letter	Description
none	System working normally
d	Channel disabled
F	Channel is in Fault condition
C	Channel cannot communicate with transmitter
c	Channel Configuration Fault
L	Channel is in low alarm
M	Channel is in mid alarm
H	Channel is in high alarm
S	Channel has a STEL alarm
T	Channel has a TWA alarm
I	Channel has an IDLH alarm

Example of a Fault condition:



NOTE: The display may show additional information related to the channels

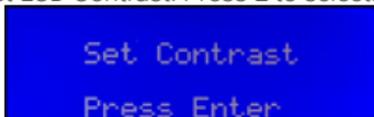
and relays depending on additional settings that can be enabled. Some of these settings are Override and ON/OFF Delays. These will show a counter indicating how much time is remaining until the action will end or start. For more information, refer to the FCS Operation Manual.

NOTE: You can temporarily view the Splash Screen on the RDM by pressing the ARROW UP button once. This allows you to check the model and firmware version of the RDM. The screen will display this information and then return to the Normal Display.

6.5 Set LCD Display Contrast Level

The contrast level of the LCD display can be changed to be made more visible in high light, low light and/or different temperatures that may require a different contrast setting.

In the Basic Menu (passcode 1001), press the ARROW keys to scroll through the menu and select Set LCD Contrast. Press E to select.



Use the ARROW buttons to change the numbers according to your preferred brightness/darkness of the display. Press E to move to the next character. Press E to save the entry and exit the screen.



6.6 Modbus® Settings

The RDM operates on a local area network (LAN) using Modbus® RS-485 RTU serial communications. In order for communication to be successful between devices, be sure your network connection is complete, the network termination switches are set appropriately and all the devices are configured with the same baud rate, character format, etc. Each device will have its own unique Modbus® ID.

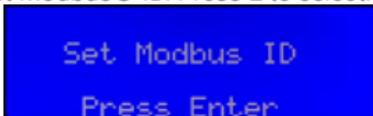
6.6.1 Change Modbus® ID

The RDM Remote Display has two Modbus® IDs. The first is used to read and write to the Holding Registers when changing the settings, resulting in a response to every request sent. This default Modbus® ID is 230.

The second Modbus® ID is used to receive the screen updates from the FCS. There is no response from the RDM on this line. This Broadcast Modbus® ID number is 253 and it cannot be changed. The advantage of having the second Modbus® ID is to save network traffic. If there are several RDMs listening to the same FCS, they each don't need to respond to broadcast screen updates.

If you would like to change the read and write Modbus® ID, (adding a 2nd, 3rd or 4th RDM to the system) their IDs should be consecutive, starting with the base address 231.

In the Basic Menu (passcode 1001), press the ARROW keys to scroll through the menu and select Set Modbus® ID. Press E to select.



Use the ARROW buttons to change the numbers to the correct Modbus ID. Press E to move to the next character. Press E to save the entry and exit the

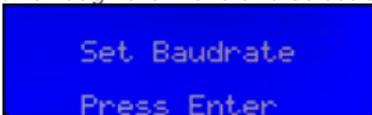
screen.



```
Change Modbus ID
      230
      ^
ENTER Accept / EXIT
```

6.6.2 Set Baud Rate

All devices on the same network must have the same baud rate. The factory default Modbus® baud rate for all CETCI Modbus® devices is 19,200. If you need to change the baud rate, in the Basic Menu (passcode 1001), press the ARROW keys to scroll through the menu and select Set Baud rate.



```
Set Baudrate
Press Enter
```

Press E to select. Use the ARROW keys to scroll through the list of baud rates to choose from:

- 9,600
- 14,400
- 19,200 (default)
- 38,400
- 57,600
- 76,800
- 115,200

Press E to save the entry and exit the screen.



```
Local Baud (^ - v)
      19,200 Auto off
      ^
ENTER Accept / EXIT
```

If you would like the RDM to automatically select the appropriate baud rate,

choose Auto on. The RDM will sample existing traffic on the network to determine the correct baud rate. This is useful if the RDM gets lots of framing errors. It will automatically change the baud rate until it stops getting the errors. If Auto is turned off, the RDM will be locked into whatever baud rate has been selected.

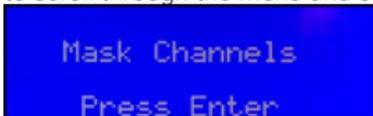
NOTE: The FCS baud rate and the RDM baud rate (and all devices on the FCS LAN network) must be the same for the system to work.

6.7 Mask Lines

NOTE: The mask lines functionality is only applicable to the FCS model with 4 or less channels. If connected to the other FCS models, the display configuration of the channels should be done using the FCS.

The mask lines function masks the line, not the channel.

The RDM display can be configured to show or not show each of the 4 channels' data. The default setting is to display all channels. When connected to the FCS, to display selected channels, in the Basic Menu (passcode 1001), press the ARROW keys to scroll through the menu and select Mask Channels.



```
Mask Channels
Press Enter
```

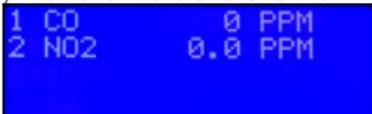
Press E to select. Use the ARROW keys to choose SHOW or HIDE the information for each channel.



```
Channel Mask
Ch1  Ch2  Ch3  Ch4
SHOW SHOW HIDE HIDE
      ^
```

Press E to save the entry and exit the screen.

Example of RDM display with Channel 3 and Channel 4 hidden:

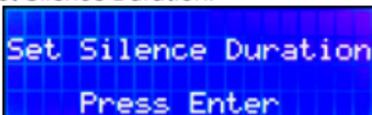


```
1 CO      0 PPM
2 NO2    0.0 PPM
```

6.8 Set Silence Duration

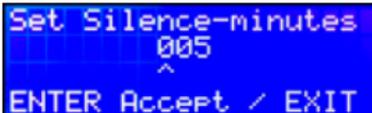
Use the Set Silence Duration to configure the length of time the RDM should be silenced for a channel that has gone into alarm. Only the channels being displayed by the RDM can trigger the buzzer or strobe connected to the RDM. Only the channels being displayed by the RDM can be silenced. To silence the buzzer or stop the strobe, push the E button. The alarm action will be halted for the set silence duration. The factory default silence duration is 5 minutes.

In the Basic menu (passcode 1001), press the ARROW keys to scroll through the menu and select Set Silence Duration.



```
Set Silence Duration
Press Enter
```

Press E to select. Use the ARROW buttons to change the numbers to the desired time (in minutes) Press E to move to the next character. Press E to save the entry and exit the screen.



```
Set Silence-minutes
      005
      ^
ENTER Accept / EXIT
```

7 MAINTENANCE

The RDM Remote Display requires no assembly and virtually no maintenance. It is important to ensure that water and/or dust is not somehow entering the enclosure and physically damaging the circuit board or internal components.

8 TROUBLE SHOOTING

RDM won't power up. (blank display)

Is the power properly connected? Check the connections. Refer to Section 5.5 Wiring Power Connections. Check the display contrast. Refer to Section 6.5 Set LCD Display Contrast Level.

RDM constantly shows "Connection Lost". Check that the number of Remote Devices is set correctly in the FCS.

RDM cannot be seen by the Controller and/or the BAS / DDC on the Modbus® network.

- Check the Baud rate. All devices in the network must have the same Baud rate. Refer to Section 6.6.2 Change Modbus® Baud Rate.
- Check the Modbus® ID. Each device must have a unique ID assigned to it. Refer to Section 6.6.1 Change Modbus® ID.
- Check that local area network wiring is correct, especially the A and B lines to make sure they are not swapped between devices on the network.
- Check that local area network wiring is correct, especially the A and B lines to make sure they are not swapped between devices on the network.

Changes made using the FCS regarding how/what channels are displayed on the RDM do not show as expected.

Changing the display functionality or priority selection channels for the RDM on the FCS generally require a restart of the FCS. Push and hold the button on the FCS circuit board until the buzzer chirps (approximately a count of 10), let go and the FCS will do a restart. **NOTE:** Restarting the FCS only resets the FCS, the transmitters and peripherals are not affected.

SAFER AIR EVERYWHERE.

www.critical-environment.com

RDM-20211213-Rev-B

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